## **REMARKS**

With this response, claim 1 has been amended, and claims 3-5 have been cancelled without prejudice or disclaimer. New claims 6 to 37 have been added. Upon entry of the present amendment, claims 1, 2, and 6-37 are pending. Reconsideration of this Application is requested. No new matter has been added by the present response.

Support for the amendment to claim 1 can be found in the specification at, for example, page 16, lines 1-15; page 17, lines 3-12 and 21-24; page 18, lines 11-17; page 20, line 13 to page 22, line 15; and at page 26, line 3, and in original claim 3.

Claims 2 has been amended to conform with the recitation of amended claim 1.

Support for the newly presented claims can be found, for example, in cancelled claims 3-

5. Additional support for the new claims can be found throughout the specification at, e.g., the sections of the specification presented in the table below.

New Claim	Support
6	Page 17, line 9, and Examples 4 and 5.
7	Page 11, lines 19-20, page 17, line 15; and page 22, lines 9-13.
8	Page 17, lines 17-21.
9	Page 20, lines 14-16.
10	Page 17, lines 26-27.
11	Page 4, line 10.
12	Page 17, lines 21-24.
13, 14	Page 1, lines 17-22; page 2, line 21; page 10, line 4; page 13, lines 9 and 12, 15 and 27; page 14, lines 3, 13, 19 and 22; page 15, lines 2-4; page 27, lines 22-25; page 28, lines 10-11; page 29, lines 5-7, and page 31, lines 14-15
15	Page 26, lines 2 to 5.
16	Page 24, lines 12-15.
17	Page 24, lines 12-13.
18	Page 11, lines 7 to 12; page 16, lines 1-3; page 17, lines 3-5, and 7-11; page

	18, lines 9-17; page 19, lines 7-12; page 26, lines 2-4; Example 1 (pages 26 to 28). The support for step "(c)" can be found, for example, at page 16, lines 13 to 15, and Figures 1b, 3 and 4.
19	Page 22, lines 1-2.
20	Figures 1b, 3 and 4
21	Original claim 3
22	Page 22, lines 9-15
23	Page 22, lines 3-6
24	Original claim 3, page 20-24.
25, 26	Page 17, line 9, and Examples 4 and 5.
27, 28	Page 11, lines 19-20, page 17, line 15; and page 22, lines 9-13.
29, 30	Example 1, page 2-5.
31	Page 17, lines 21-24.
32	Page 10, lines 15-18.
33	Page 29, lines 17-19; at page 28, at lines 3-5 and lines 23-24; and page 25, lines 9-10.
34	Page 28, lines 3-5 and 23-24; and page 25, lines 9-10.
35	Page 25, lines 9-10 and page 28, line 4-5.
36	Page 25, lines 5-10, page 28 lines 3-5 and 23-24.
37	Page 29, lines 17-19.

# Oath/Declaration

The Examiner contends that the Oath or Declaration is defective under 37 C.F.R. 1.67(a) because it allegedly does not identify the application by serial number and filing date.

In response, Applications would like to draw the examiner's attention to the fact that the executed Declaration filed on June 5, 2002, identified the present application by serial number and filing date (see page 1 of the Declaration, copy enclosed). It is respectfully submitted that the executed Declaration complies with these and all other requirements of 37 C.F.R. 1.67(a) (see page 1 of the enclosed Declaration).

### **Claim Objection**

The objection to claim 5 is under 37 C.F.R. 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim, has been rendered moot by the cancellation of claim 5.

### **Anticipation**

#### 1. Dean

Claim 1 has been rejected under 35 U.S.C. § 102 (b) as allegedly anticipated by U.S. Patent No. 4,532,142 to Dean et al (hereinafter "Dean"). Dean describes a coffee maker, which the Examiner asserts comprises all the elements of Claim 1 of this application.

Applicants respectfully traverses the rejection as follows. Dean does not teach or suggest "a liquid culture medium" as recited in Claim 1, but instead is limited to the use of water (see, e.g., col. 3, lines 21-41). By contrast, "liquid culture medium" as used in the Claims refers to a liquid with nutrients and minerals, as described in Table 1 on page 20 and Table 2 on page 22. Dean clearly envisions the use of plain, unenriched water. Furthermore, Dean does not teach an adjustment of the level of the liquid medium between an initial flooding condition and a lower or equal level of the medium with respect to the matrix, in a subsequent maturation step. Dean also teaches two separate but functionally related tanks or vessels (the coffee holding vessel and the vessel containing the drained liquid). In the present invention, the matrix and culture medium are contained within the same vessel.

#### 2. Birdwell

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as allegedly anticipated by U.S. Patent No. 5,409,834 to Birdwell et al (hereinafter "Birdwell"). Birdwell describes a method and apparatus for removing pollutants from polluted air.

Applicants respectfully disagree with the Examiner's reading of Birdwell. Birdwell does not teach spraying a liquid culture medium onto the biomass, but instead teaches spraying of liquid containing microbes into a stream of polluted air (see Birdwell column 4, lines 14-18). Further, Birdwell does not teach "gas control equipment for controlling the concentration of oxygen," but simply teaches a blower and exhaust conduit that provides air flow.

#### 3. O'Brien

Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as allegedly anticipated by U.S. Patent No. 5,246,854 to O'Brien (hereinafter "O'Brien"). O'Brien describes a bioreactor for the growth and harvesting of filamentous fungi.

Applicant respectfully traverses the rejection as follows. O'Brien does not teach a level of liquid culture medium being equal or lower than the immobilization matrix, but a cylinder that "is partially submerged" (see O'Brien, column 2, line 42-45). Further, O'Brien does not teach or suggest a spray of liquid culture medium to irrigate existing biomass, but instead teaches a spray of liquid containing fungus used to inoculate the bioreactor (see O'Brien, column 5, line 12-14). Finally O'Brien does not teach an adjustment of the level of the liquid medium between an initial flooding condition and a lower or equal level of the medium with respect to the matrix, in a subsequent maturation step.

### 4. Endo, Weathers '464, Weathers In Vitro, and Dilorio

Claims 1 and 2 are also rejected under 35 U.S.C. 102(b) as being anticipated by each of the following references: U.S. Patent No. 5,043,283 to Endo et al (hereinafter "Endo), U.S. Patent No. 4,857,464 to Weathers et al (hereinafter "Weathers '464"), and by journal publications by Weathers (hereinafter "Weathers In Vitro"), and Dilorio (hereinafter "Dilorio").

Applicants traverse these rejections as follows. Firstly, these documents ("Endo", ... "Weathers '464", "Weathers In Vitro", and "Dilorio" (also in the Weathers group)) teach horizontal filters designs and not a vertical configuration according to the present invention. Secondly, none of these documents teach an adjustment of the level of the liquid medium between an initial flooding

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condition and a lower or equal level of the medium with respect to the matrix, in a subsequent maturation step.

In addition, "Weathers '464" teaches away from the present invention when it states at column 5, between lines 42-44 that "[I]t is of paramount importance, in the practice of the invention, that the cells are not sprayed with nutrient". In contradistinction thereto, the present invention teaches a spraying of medium. Applicants stress that Weathers '464 and Weathers In Vitro (as well as Weathers '928 [see below]) aim at either separating toxins from the cells which are growing, or isolating metabolites produced by the growing cells. In addition "Weathers In Vitro", teaches at page 731, left column, in the second full paragraph,

"[W]hen a new plant was tested for its performance within the mist bioreactor, conditions known to be successful in agar were employed. In all cases, the conditions translated readily to the mist bioreactor".

Applicants refer the Examiner to line 15 of page 14, carrying over to line 10 of page 15, of the instant disclosure which teaches that Petri dishes (e.g. agar) previously mostly used for the maturation of conifer somatic embryos, do not enable scale-up and thus mass production of mature conifer somatic embryos. At page 9, line 24 the instant application teaches

"Most research groups in this field carry out the maturation of conifer somatic embryos using gelled medium contained in small Petri dishes which yield less than 100 embryos per plate".

Clearly, conditions of growth and maturation must be adapted to achieve the high level of mature somatic embryos of the present invention. Dilorio teaches at page 461, left column, bottom of page

"based on the similarities of the results for growth in shake flasks vs nutrient mist bioreactor, culture regimes and medium optimization in shake flasks are transferable to the nutrient mist bioreactor, thereby facilitating process development. However, due to the differences between the respective physiological environments generated by these culturing systems (i.e. shear stress), certain process variables may not be analogous...". Application No.: 10/018,595

Of note is also that Dilorio teaches the growth of roots, not of conifer somatic embryos.

Taken together, Weathers '464, Weathers In Vitro, and Dilorio thus teach away from the claimed invention. In addition, the Examiner is referred to page 8 from line 14, to page 9, line 27, which teaches that conifer embryos are much more difficult to grow and to grow to a large scale than other plant species.

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#### 5. Weathers '928

The Examiner has rejected Claims 1 through 4 as anticipated by U.S. Patent No. 5,413,928 to Weathers et al (hereinafter "Weathers '928"). This reference is directed to nutrient mist bioreactors for cultivating plant root tissue. This reference teaches the same type of culture chamber as the Weathers '464 patent (see col. 4, ll. 5, to col. 5, ll. 5), and thereby utilizes horizontal filters designs. Accordingly, the reference fails to teach a vertical configuration of the immobilization matrix, and thereby cannot anticipate the bioreactor of the present claims.

Further, as mentioned above, the reference aims at separating toxins from the cells which are growing, or isolating metabolites produced by the growing cells, "with limited loss of beet tissue viability" (Weathers '928, col. 5, ll. 20-23). By contrast, the present method claims 18 and 24, and the claims dependent thereon, are directed to a method for mass production of mature conifer somatic embryos. Since the Weathers '928 reference does not teach or suggest anything about mass production of beets, much less mass production of mature conifer somatic embryos, whatever isolated method steps may be extracted from Weathers '928, it fails to anticipate the present invention. The purpose of the reference is to provide a method for permeabilizing plant tissue with minimal loss of tissue viability, <u>not</u> a method according to the present invention.

In fact, this Weather reference can also be considered as teaching away from the present invention when it states at column 5, lines 8-11

"for the purposes of the subject invention, <u>any method of cultivation known in the art can be used</u>. For example, <u>cells can be grown on solidified agar gels</u> or in liquid (suspension) cultures" [emphasis added].

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Yet again, the Examiner is referred to line 15 of page 14, carrying over to line 10 of page 15, of the instant disclosure which teaches that Petri dishes (e.g. agar) previously mostly used for the maturation of conifer somatic embryos, do not enable scale-up and thus mass production of mature conifer somatic embryos.

In view of the above and foregoing, the applicant respectfully submits that none of the cited references teaches (or suggest) the instant invention as set forth by claims 1-2 and 6-37. The Examiner is thus requested to withdraw each rejection under 35 U.S.C. § 102 (b).

### **Obviousness**

Claims 3 to 5 are rejected under 35 U.S.C. 103 (a) as being obvious over Weathers '928 in view of U.S. Patent No. 5,119,588 to Timmis et al (hereinafter "Timmis"). The Examiner contends that it would have been obvious to modify the method of Weathers '928 to grow conifer somatic embryos as in Timmis, or, alternatively, that it would have been obvious to modify the method of Timmis to include a sprayer as taught in Weathers '928.

Firstly, it is noteworthy that claims 3 to 5 have been cancelled and replaced by claims 18 and 24, and claims dependent thereon. The Examiner is referred to Applicants comments on Weathers '928, which teaches away from the present invention and which stresses the uncertainty in determining growth conditions for plant tissues -- "certain process variables may not be analogous". Once again, Applicants reiterate the complexity of growth/maturation of conifer somatic embryos, as compared to other plant tissues. Hence, Weathers '928 cannot be considered as rendering obvious (alone or in combination with Timmis) the bioreactor and process for mass production of conifer somatic embryos of the present invention.

With respect to Timmis, Applicant respectfully submits that the Examiner has failed to meet the burden of proving a *prima facie* case of obviousness, since Timmis utilizes a "soil-like particulate medium" whereas the method of Weathers suspends the plant tissue on a nylon filter and utilizes a liquid medium (Timmis is in essence downstream from the production of embryos of the present invention). Timmis teaches away from the combination since it states that "filt is important"

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that the plug be comprised of a particulate medium rather than a predominantly liquid medium" (see Timmis, column 7, lines 40-43). Accordingly, there is no motivation to combine the method of Timmis with that of Weathers '928, because Timmis is non-analogous art. In addition, since neither Weathers '928 nor Timmis teaches or suggests an immobilization matrix of vertical configuration, the initial flooding condition and subsequent maturation step, the mass production of mature embryos etc, this hypothetical combination cannot correct the defects of each reference.

In view of the above and foregoing it is submitted that the rejection under 35 U.S.C. § 103 (a), as being unpatentable over Weathers '928 in view of Timmis, should be withdrawn.

# **Conclusions**

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Dated: March 11, 2004

Respectfully submitted,

Anna Lövqvist, Ph.D.

Limited Recognition Under 37 C.F.R. 10.9(b) (see attached)

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